Wafi Hassan 2025

Gravitational Questions for A.P.

1) If the distance between two-point particles is doubled the gravitational force between them

(a) decreases by a factor of 4

b) decreases by a factor of 2

c) increases by a factor of 2

d) increases by a factor of 4

e) cannot be determined

$\frac{1}{2}mv^2$

$\frac{1}{2}m\frac{Gm}{2r}$

2) At the surface of the Earth, an object of mass m has weight w. If this object is transported to an altitude that's twice the radius of the Earth, at the new location,

a) its mass is $m/2$ and its weight is $w/2$

b) its mass is m and its weight is $w/2$

c) its mass is $m/2$ and its weight is $w/4$

(d) its mass is m and its weight is $w/4$

e) its mass is m and its weight is $w/9$

3) A moon of mass m orbits a planet of mass 100m. Let the strength of the gravitational force exerted by the planet on the moon be F_1 and let the strength of the gravitational force exerted by the moon on the planet to be F_2. Which of the following is true?

a) $F_1 = 100F_2$ b) $F_1 = 10F_2$ (c) $F_1 = F_2$

d) $F_1 = 100F_2$ e) $F_2 = 100F_1$

4) The dwarf planet Pluto has 1/500 the mass and 1/15 the radius of Earth. What is the value of g (in m/s^2) on the surface of Pluto?

$g = \frac{Gm_{earth}}{r^2}$

$g = \frac{Gm}{R^2}$

a) 50/225 b) 50/15 c) 15/ 50

(d) 225/50 e) 225/500

5) A satellite is currently orbiting Earth in a circular orbit of radius R; its kinetic energy is K_1. If the satellite is moved and enters a new circular orbit of 2R, what will be its kinetic energy?

a) $K_1/4$ (b) $K_1/2$ c) K_1 d) $2K_1$ e) $4K_1$

6) A moon of Jupiter has a nearly circular orbit of radius R and an orbit period of T. Which of the following expressions gives the mass of Jupiter?

a) $2\pi R$ b) $4\pi^2 R/ T^2$ c) $2\pi R^3/ (GT^2)$

d) $4\pi R^2/ (GT^2)$ e) $4\pi^2 R^3/ (GT^2)$

7) Two large bodies, body A of mass m and body B of mass $4m$, are separated by a distance of R. At what distance from Body A, along the line joining the bodies, would the gravitational force on an object be equal to zero?

a) R/16 b) R/8 c) R/5 d) R/4 e) R/3

8) The mean distance from Saturn to the Sun is 9 times greater than the mean distance from Earth to the Sun. How long is a Saturn year?

a) 18 Earth years b) 27 Earth years

c) 81 Earth years d) 243 Earth years

e) 729 Earth years

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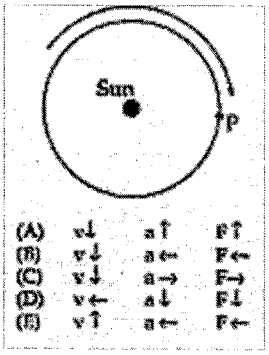
9) You are looking at a top view of a planet orbiting the Sun in a clockwise direction. Which of the would describe the velocity, acceleration, and force acting on the planet due to the Sun's pull at point P?



10) Which of the following statements are true for a satellite in outer space orbiting the Earth?

I. There are no forces acting on the satellite.

II. The force of gravity is the only force acting on the satellite.

III. The force of gravity is balanced by the outward force of the object.

a) I only b) II only c) III only

d) Either I or III may be correct

e) Either II or III may be correct

Free Response: A robot probe lands on a new, uncharted planet. It has determined the diameter of the planet to be 8×10^6 m. It weighs a standard 1 kg and determines the 1-kg weighs only 5 N on the new planet.

a) What must the mass of the planet be?

b) What is the acceleration due to gravity *on this planet? Express you answer in* m/s^2.